

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Patent Application of: Rami VERBIN

Serial No.: 09/825,189

Filed: April 3, 2001

For: COMMUNICATION START-UP WITH VARIANT SPECTRAL
DENSITY MASK

Group Art Unit: 2637

Examiner: Betsy L. Deppe

RULE 132 DECLARATION OF RAMI VERBIN

I, the undersigned, Rami Verbin of 7/12 Beit-Tzuri Street, Tel-Aviv, Israel, hereby declare as follows:

1. I am the Applicant in U.S. Patent Application No. 09/825,189 (hereinafter "the application").

2. I have been employed as a professional in the field of digital communication systems for 10 years. I received a Masters degree in Electrical Engineering from Tel-Aviv University in 1991. I am currently employed as a program manager in the Telecom Group - Access Division of ST Microelectronics Israel Ltd.

3. Over the past 10 years, I have developed signal processing algorithms, modems, and communication protocols, particularly for Digital Subscriber Line (DSL) systems. In my capacity as a program manager, I have also had the opportunity to supervise many junior engineers, as well as interacting with field engineers who have installed and serviced products made by our company. I have participated actively, as a designer and

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as a manager, in the development of six different DSL variants: ADSL over POTS, ADSL over ISDN, ADSL LITE, ReachDSL, VDSL-QAM, and VDSL-DMT.

4. Claims 8-11 and 23-26 of the present patent application were rejected under 35 U.S.C. 112, first paragraph, for failing to describe how to determine a level of attenuation to enable reliable detection of a training signal such that one skilled in the art could have made and/or used the invention. These claims were also rejected under 35 U.S.C. 112, second paragraph, for not providing a definition of what constitutes "reliable detection."

5. Contrary to the opinion stated by the Examiner, I believe that an engineer of ordinary skill in the DSL art would have understood the meaning of "reliable detection" in the context of the present patent application. Furthermore, such an engineer would have been readily capable of determining an appropriate level of attenuation to achieve such reliable detection, without undue experimentation. My reasons for reaching this conclusion are set forth below.

6. The term "reliable detection" must be understood in the context in which it is used in the present patent application and in the claims. This context is explained in the Background section of the application (page 3, line 28 - page 4, line 5):

"Typically, the modems automatically run through a standard start-up procedure for this

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purpose before beginning actual data communications. Each of the modems transmits a known training signal to the other. The receiving modem compares the received signal to the expected training signal in order to "learn" the channel characteristics. In ADSL modems, for example, the comparison is used to adaptively set the coefficients of digital equalization filters in order to compensate for distortion in the channel."

In other words, "reliable" clearly means sufficiently reliable to permit the modem to learn the channel characteristic and correctly set the equalizer coefficients.

7. Methods for equalizer adaptation and training were well known in the art at the time of the present invention and were well understood by people of ordinary skill in the art. Such methods are described in standard texts, for example, Starr et al., *Understanding Digital Subscriber Line Technology* (Prentice Hall, 1999), pages 226-235.

8. A DSL engineer of ordinary skill would have readily understood, based on general knowledge and on the teachings of the present patent application, what sort of level of attenuation would be required to "enable reliable detection of the training signal." As I stated in the present patent application (page 14, line 28 - page 15, line 6):

"The receiver uses the corrected signal in

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accurately estimating the channel response and/or setting suitable equalization filters, at an estimation step 76. Typically, the receiver comprises an adaptive equalizer, based on one or more digital filters. The coefficients of the filters are adjusted based on the corrected signal, using a least mean square (LMS) algorithm or any other suitable technique known in the art, so as to minimize the error in decoding the training signal at the receiver."

Thus, in the context of adaptive equalizer training, "reliable detection" means simply that the level of the detected training signals is sufficient to enable the training algorithm to reliably achieve its purpose, i.e., to converge consistently within a reasonable time frame. An engineer of ordinary skill would have understood that this object can be achieved only if the training signals are detected with sufficiently high signal/noise ratio (SNR). SNR below such a level would not be sufficient to enable reliable detection.

9. The precise SNR that is required for reliable detection differs from system to system, depending on factors such as the design of the receiver and the noise-sensitivity of the training and equalization algorithms. The required SNR may be estimated by calculation, but it is most often determined by trial-and-error testing of the actual communication system in question or by software simulation. Evaluating the SNR requirements of the startup algorithms is part of the normal design flow

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of a DSL modem, regardless of whether or not the present invention is employed. Hence, an engineer involved in designing or setting up the system would collect the required SNR information in any case. For these reasons, I did not feel it was necessary or appropriate to give a more quantitative definition of the terms in the present patent application.

10. The present patent application gives guidelines for setting the attenuation level that an average DSL engineer could have understood and followed. Specifically, on page 5, lines 10-15, I noted:

"Preferably, the training signals within the notch are of sufficiently low power to meet the constraints imposed by the PSD mask. Alternatively, if necessary, the power of the training signals within the notch is increased sufficiently above the mask constraint so as to enable the receiver to detect them."

I went on to state on page 13, lines 9-14:

"The power level in the notch of PSD_NEW should be just strong enough to allow reliable detection of the training signals by the receiver of modem 49, while remaining as close as possible to mask 54 in order to minimize degradation of reception (albeit temporary degradation) by neighboring modems."

11. Based on these passages, the engineer would have clearly understood that he or she should adjust the signal level in the attenuated segment of the spectral

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range to the minimum possible value that would provide reliable detection in the system in question. For example, the engineer could begin working at high attenuation (i.e., low signal power in the attenuated segment), and then gradually reduce the attenuation until consistent convergence of the training algorithm was achieved. This sort of simple trial-and-error procedure could have been completed within a few days' work and was well within the level of skill of nearly all engineers of my acquaintance.

12. The points explained above demonstrate that a person of ordinary skill in the art would have understood and been able to implement the method and apparatus recited in claims 8-11 and 23-26 of the present patent application.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and conjecture are thought to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application of any patent issued thereon.

[Handwritten signature]
Rami Verbin, Citizen of Israel
7/12 Beit-Tzuri Street, Tel Aviv, Israel
November 8, 2004